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Flying Squirrels (*Glaucomys volans*) of Middle America

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Specimens of flying squirrels (*Glaucomys volans*) from Middle America are accumulating. When A. H. Howell revised the American flying squirrels in 1918, he listed only two specimens from Mexico. Hooper (1952) recognized three subspecies in Mexico based on six specimens. The number of Middle American flying squirrels available for study is now 38, and therefore individual variation in the geographic races can be better understood. Regional color differences are correlated with distinctive cranial features.

With the exception of the three type specimens in the United States National Museum, all the available material known to me to be in North American collections has been brought together for study. The state of Chiapas is best represented by specimens. Material from other Mexican states and other countries in Central America is still scanty.

Measurements (in millimeters) and weights (in grams) are listed in tables 1 and 2. Most of the measurements are standard in mammalogy, but one requires explanation: the cranial depth is a dorsoventral measurement of the skull taken from the dorsal limit of the braincase to a plane that passes through the tips of the incisors and the ventral borders of the audital bullae. The capitalized names of colors used in the descriptions are from Ridgway (1912).

The abbreviations representing names of museums from which specimens have been recorded are:

A.M.N.H., the American Museum of Natural History
C.N.H.M., Chicago Natural History Museum

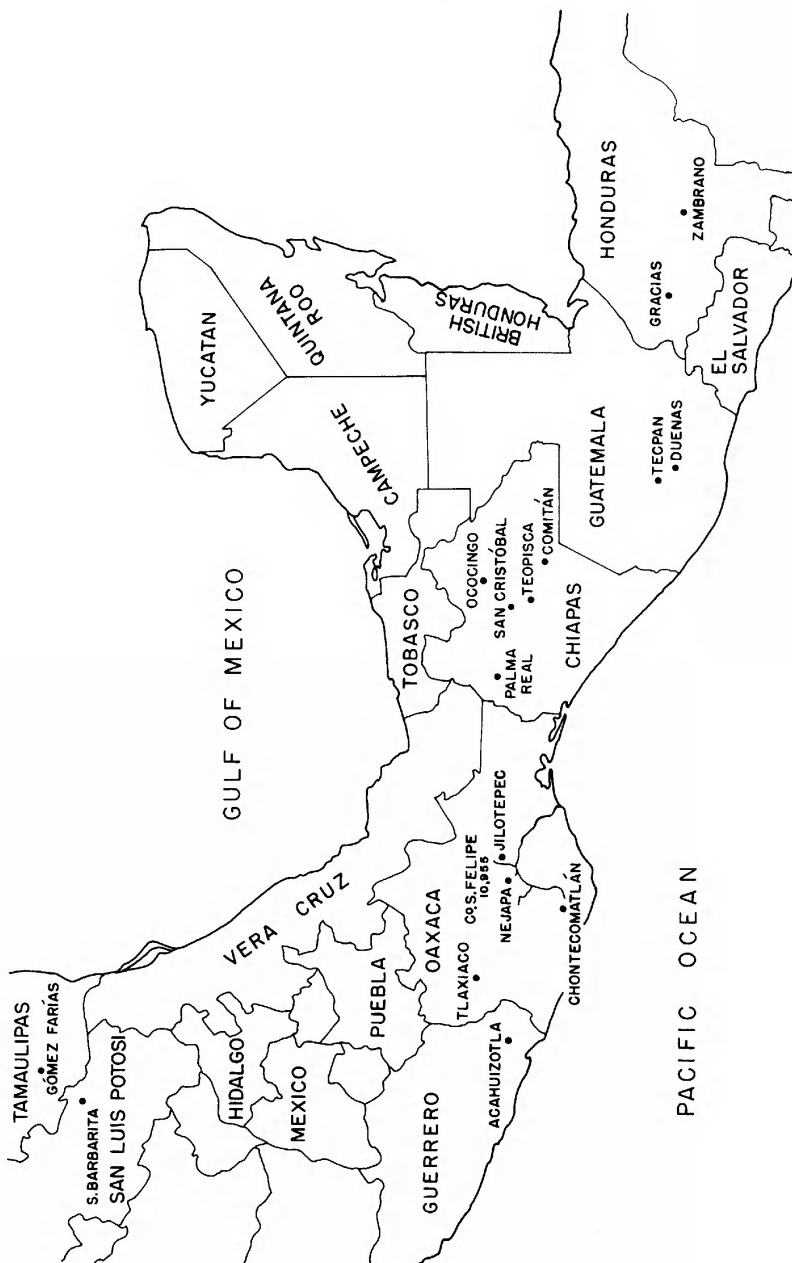


FIG. 1. Map of Middle America, showing localities where flying squirrels have been collected.

I.B.M., Instituto de Biología, Mexico
L.S.U., Louisiana State University
T.A.M., Texas Agricultural and Mechanical College
U.K., University of Kansas
U.M., University of Michigan
U.S.N.M., United States National Museum

For the loan of material I am especially indebted to Dr. Charles O. Handley, Jr., United States National Museum, who has not only measured type specimens for this report but has given me the benefit of his valued opinion. I also wish to express my gratitude for the loan of material to Mr. Philip Hershkovitz, Chicago Natural History Museum; Dr. E. Raymond Hall, University of Kansas; Dr. William B. Davis, Texas Agricultural and Mechanical College; Dr. George H. Lowery, Jr., Louisiana State University; Prof. Bernardo Villa R., Instituto de Biología, Mexico, and Dr. Emmet T. Hooper, University of Michigan. The photographs of skulls were made by Mr. Robert E. Logan, Chief Photographer, the American Museum of Natural History.

***Glaucomys volans chontali*,¹ new subspecies**

Figures 2A, 4A, 6A

TYPE: A.M.N.H. No. 185014; skin, skull, and part of skeleton; adult male; from Santo Domingo, Chontecomatlán, District of Yautepec, Oaxaca, Mexico, altitude about 7000 feet; collector Thomas MacDougall; original no. 2149; January 21, 1960; skin in good condition. Originally preserved in spirits for two months; skull complete, slightly crushed in mastoid region on left side. This is the only known specimen.

RANGE: Known only from the type locality.

DIAGNOSIS: Smallest and most brightly colored form of the Middle American flying squirrels.

Glaucomys volans chontali is nearest in size to *Glaucomys volans madrensis* of the Sierra Madre of Chihuahua, Mexico, but is smaller and more richly colored, has hind feet that are blackish instead of buffy, soles of feet that are naked, and molariform teeth that are small—noticeably smaller than in any other individual in the entire series of Middle American flying squirrels examined.

DESCRIPTION OF TYPE: General color of upper parts nearly uniform Ochraceous-Tawny, fur dark Hair Brown at base, followed by a band of Dark Grayish Brown and a broad tip of bright Ochraceous-Tawny; top of head (from nose to neck) like back but of paler shade of Ochraceous-Tawny; pelage on upper side of patagium Blackish Brown slightly

¹ Named after the Chontal Indians native to the area of the type locality.

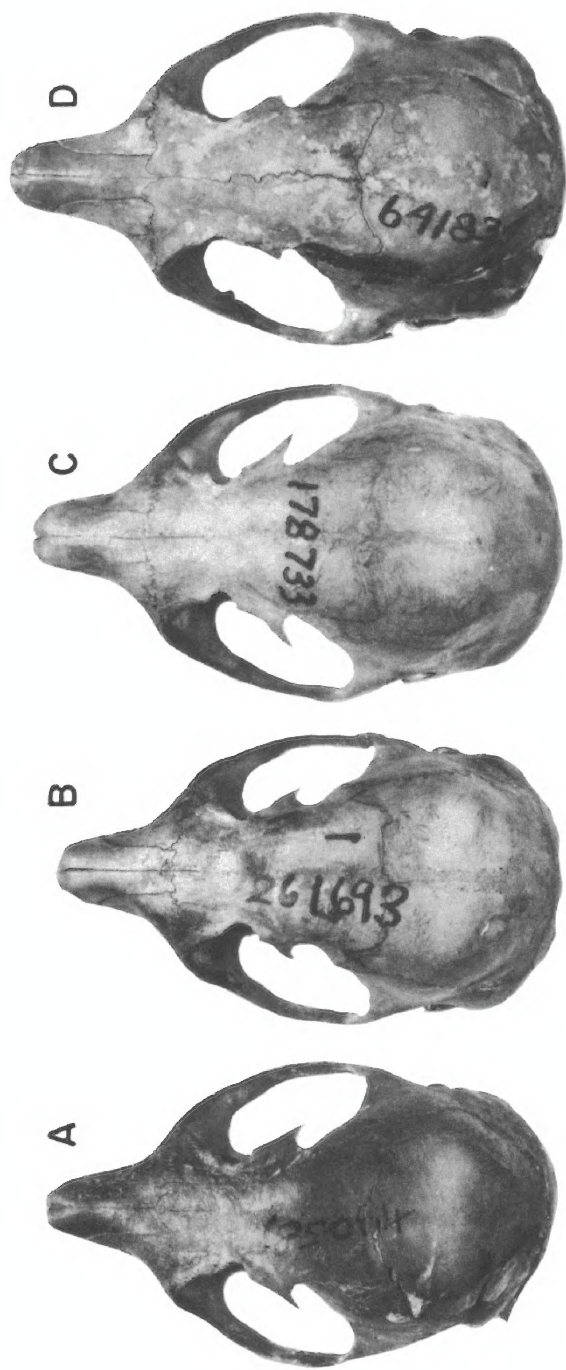


FIG. 2. Dorsal view of cranium. A. *Glaucomys volans chontali*, adult male, type, A.M.N.H. No. 185014, Chontecomatlán, Oaxaca. B. *G. v. madrensis*, adult, topotype, U.S.N.M. No. 26193, Sierra Madre, Chihuahua. C. *G. v. oaxacensis*, adult male, type, A.M.N.H. No. 178733, Jilotepec, Oaxaca. D. *G. v. goldmani*, adult male, C.N.H.M. No. 64183, Ococingo, Chiapas. All $\times 2$.

overlain with buffy-tipped hairs; upper side of tail like back but darker and becoming dull brownish towards tip; tip of nose, cheeks, lips, and under parts of body white, tinged with Pinkish Buff on under side of limbs; under side of tail and margin of under side of patagium clear Cinnamon-Buff; toes on fore and hind feet soiled whitish; upper side of fore feet Pale Pinkish Buff; upper side of hind feet to base of toes Sepia; eyes broadly rimmed with Blackish Brown, this color extending from base of whiskers back to a point halfway between eye and ear; postauricular patch Pinkish Buff. Skull small, short, and broad; braincase small and steeply domed; zygomatic arches widely spreading; rostrum short and slender; molariform teeth small.

MEASUREMENTS (IN MILLIMETERS) OF TYPE: Total length, 210; length of tail, 94; hind foot, 28; greatest length of skull, 33.4; condylobasal length, 30.4; zygomatic breadth, 20.2; mastoid breadth, 16.0; interorbital breadth, 6.3; postorbital breadth, 8.3; length of nasals, 8.0; breadth of nasals anteriorly, 4.1; breadth of palate across molars, 7.9; width of M^2 , 1.5; length of bullae, 9.3; diastema, 6.8; cranial depth, 16.5; maxillary tooth row, 6.1.

REMARKS: *Glaucomys volans chontali* is well marked and apparently represents a population of small, brightly colored flying squirrels that occupies the dry, pine and oak covered mountain slopes overlooking the Gulf of Tehuantepec, Oaxaca. The smallness of the type is further manifested in the smallness of the limb bones, scapula, pelvis, and vertebrae when compared with the corresponding bones of a male of about the same age of *G. v. oaxacensis* from San Pedro Jilotepec, Oaxaca.

Glaucomys volans goldmani (Nelson)

Figures 2D, 3C, 4D, 5C, 6D, 7C

Sciuropterus volans goldmani NELSON, 1904, Proc. Biol. Soc. Washington, vol. 17, p. 148.

Glaucomys volans goldmani, A. H. HOWELL, 1918, North Amer. Fauna, no. 44, p. 28.

TYPE LOCALITY: Twenty miles southeast of Teopisca, Chiapas, Mexico, altitude about 6000 feet.

RANGE: Forested, high, mountain slopes of Chiapas from Ocozocoautla, San Cristóbal, and Ococingo south to Comitán.

DESCRIPTION: Relatively large for the *volans* group; general color of upper parts near Sayal Brown, becoming blackish brown on upper sides of patagium; fore feet buffy white; hind feet Fuscous; tail Snuff Brown above, Pinkish Buff below; under side of body creamy white, irregularly washed with Pinkish Buff, most strongly along edges of pata-

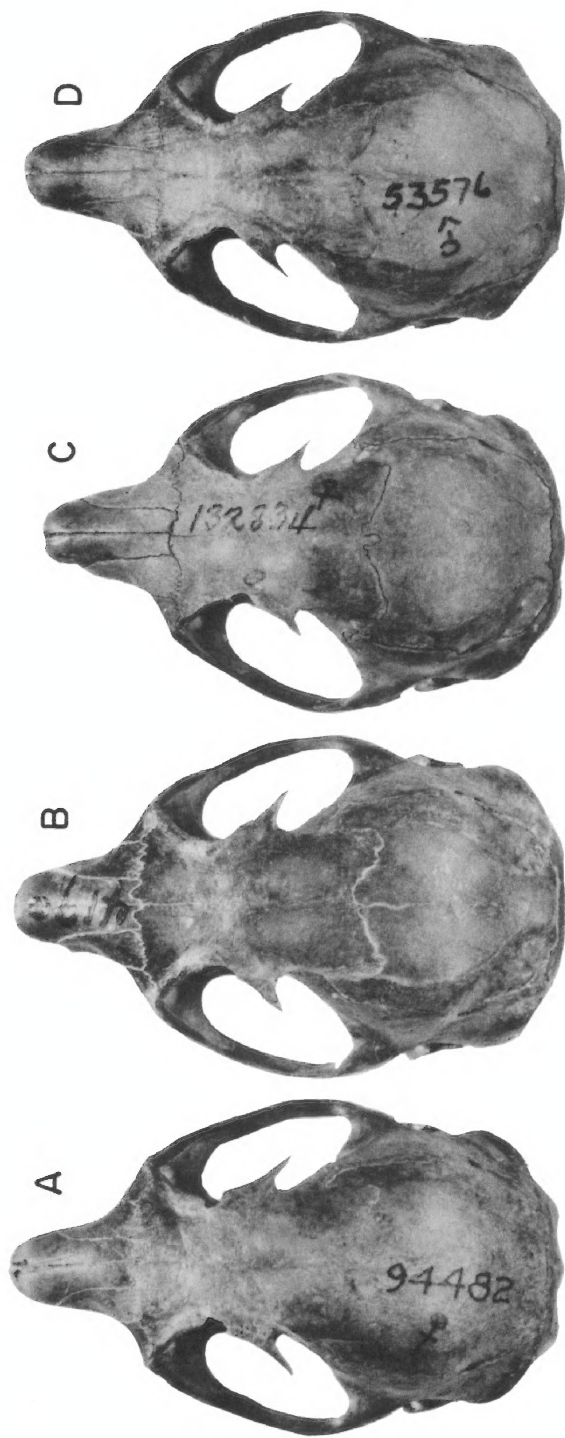


FIG. 3. Dorsal view of cranium. A. *Glaucomys volans oaxacensis*, adult female, U.M. No. 94482, Cerro San Felipe, Oaxaca. B. *G. v. herrenianus*, adult female, L.S.U. No. 4190, Santa Barbarita, San Luis Potosí. C. *G. v. goldmani*, adult female, topotype, U.S.N.M. No. 132834, Teopisca, Chiapas. D. *G. v. underwoodi*, adult male, C.N.H.M. No. 53576, Gracias, Honduras. All $\times 2$.

gium; postauricular patch Pale Pinkish Buff; tip of nose white; sides of face below eye Smoke Gray. Skull large; braincase broad and flattened; rostrum long.

SPECIMENS EXAMINED (ALL FROM CHIAPAS): Nine miles west-northwest of Comitán, three (U.K.); Ococingo, seven (C.N.H.M.); Palma Real, 6 miles north of Ocozacoautla, altitude 1800 meters, one (I.B.M.); 8 miles east of San Cristóbal, one (U.K.); 20 miles southeast of Teopisca, altitude 6000 feet, one, topotype (U.S.N.M.).

MEASUREMENTS (IN MILLIMETERS) OF TYPE (MALE) AND TOPOTYPE (FEMALE): Total length, 237, 238; length of tail, 112, 107; hind foot, 30.0, 31.5; greatest length of skull, 35.1, 34.7; zygomatic breadth, 21.3, 21.7; cranial depth, —, 16.7; maxillary tooth row, 6.5, 6.3. (For additional measurements, see tables 1 and 2.)

REMARKS: The type (a male) and the topotype (a female) of *Glaucomys v. goldmani* are old individuals with teeth much worn. Specimens from near Comitán and from Ococingo closely resemble the type and topotype in color and in most cranial characters, but the braincase is flatter and less domed. Specimens from 8 miles east of San Cristóbal and from 4 miles west of San Cristóbal are of a noticeably darker shade of Sayal Brown, have larger skulls, longer and less domed braincases, and longer rostra and nasals, than the type and topotype of *G. v. goldmani*. The specimens from near San Cristóbal approach *G. v. herrerae* in color. Because of the proximity of the Chiapan localities to each other and the inadequacy of the type specimen of *G. v. herrerae* for comparison, it seems best to assume that only one subspecies is represented in Chiapas.

Glaucomys volans herrerae Goldman

Figures 3B, 5B, 7B

Glaucomys volans herrerae GOLDMAN, 1936, Jour. Washington Acad. Sci., vol. 26, p. 463.

TYPE LOCALITY: Said to be the mountains of Veracruz. Exact locality unknown, but believed by Goldman to be a region where cloud-forest conditions prevail.

RANGE: Mountains of Veracruz, southeastern San Luis Potosí, and southern Tamaulipas.

DESCRIPTION OF TYPE: Darkest of the Middle American flying squirrels; similar in general characters to *Glaucomys volans goldmani* but decidedly darker; upper parts from tip of head to rump near Cinnamon Brown, becoming deep, glossy black on upper surface of patagium; under side of patagium and inner sides of thighs overlain with light

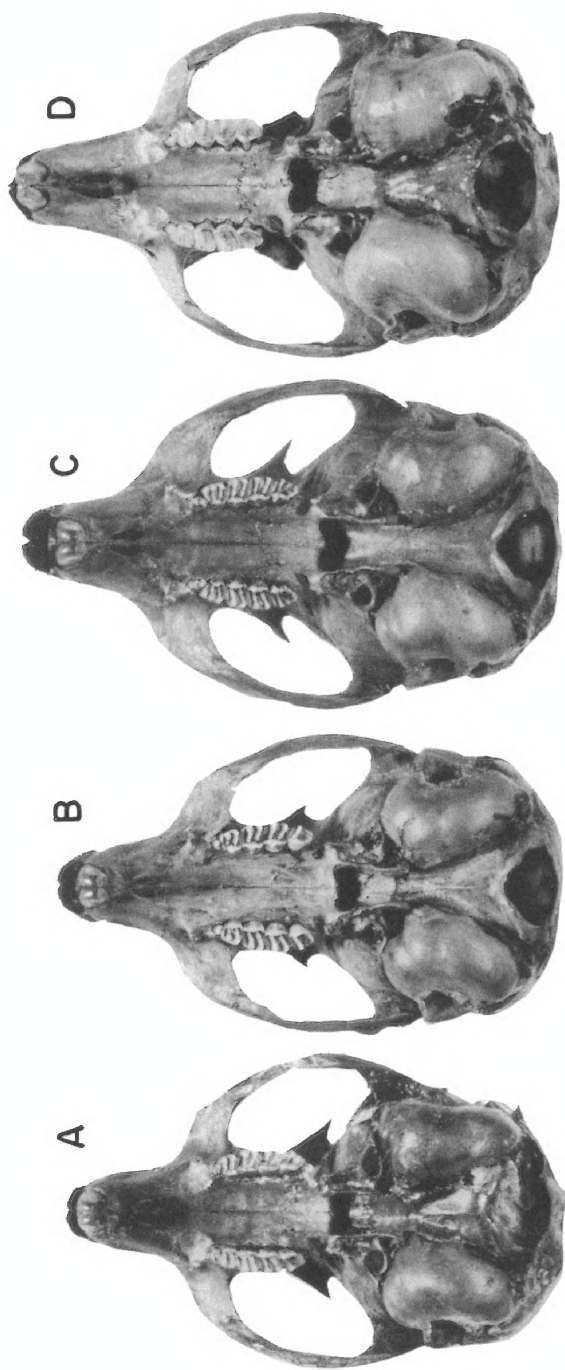


FIG. 4. Ventral view of cranium. A. *Glaucomys volans chontali*, adult male, type, A.M.N.H. No. 185014, Chontecomatlán, Oaxaca. B. *G. v. madrensis*, adult, topotype, U.S.N.M. No. 261693, Sierra Madre, Chihuahua. C. *G. v. oaxacensis*, adult male, type, A.M.N.H. No. 178733, Jilotepec, Oaxaca. D. *G. v. goldmani*, adult male, C.N.H.M. No. 64183, Ococingo, Chiapas. All $\times 2$.

Pinkish Cinnamon; tail Cinnamon Brown above, light Pinkish Cinnamon below; under side of head and body white tinged with pale Pinkish Buff; eyes widely ringed with black and postocular area black; postauricular area Cinnamon Brown; sides of nose buffy (not white all around as in *G. v. goldmani*); upper side of feet dark brownish; skull of type fragmentary.

SPECIMENS EXAMINED: San Luis Potosí: Eight miles east of Santa Barrita, two (L.S.U.). Tamaulipas: Aserraderi del Infernillo, cranial fragments only (A.M.N.H.).

MEASUREMENTS (IN MILLIMETERS) OF TYPE (SUBADULT FEMALE): Total length, 798; length of tail, 89; hind foot, 30. (For additional measurements, see tables 1 and 2.)

REMARKS: The type of *Glaucomys volans herreranus* is unique in that it is the only known Middle American specimen of flying squirrel with cinnamon colors. The type specimen was prepared by Luis G. Rubio, November 8, 1924, and possibly it was originally preserved in spirits, which may have contributed to the cinnamon coloration. This possibility is further supported by the fact that the remnants of the skull and even the teeth are warped and distorted as if from some strong chemical reaction. The two specimens from San Luis Potosí are basically similar in coloration to the type, but the dorsum is buffy or yellowish and the under sides of the tail and flight membranes are orange rather than cinnamon. The color of the upper side of the tail, the blackish postocular area, the broad blackish ring around the eyes, and the colors of the fore and hind feet are identical in all three specimens. The origin of the type is not known except that Alfonso L. Herrera, in charge of the Museo Nacional de la Historia Natural of Mexico, said (at the time the specimen was presented to the United States National Museum) that it was taken in the mountains of Veracruz.

Glaucomys volans madrensis Goldman

Figures 2B, 4B, 6B

Glaucomys volans madrensis GOLDMAN, 1936, Jour. Washington Acad. Sci., vol. 26, no. 11, p. 463.

TYPE LOCALITY: Said to be the Sierra Madre, Chihuahua, Mexico.

RANGE: Known only from the type locality.

DESCRIPTION: A small, light-colored flying squirrel somewhat similar in general characters to *Glaucomys volans texanus* of eastern Texas but paler in color. Color of type in faded worn pelage: Upper parts overlain with buffy gray, becoming pale rusty on rump and brownish black on upper surface of patagium; under parts white except on under side

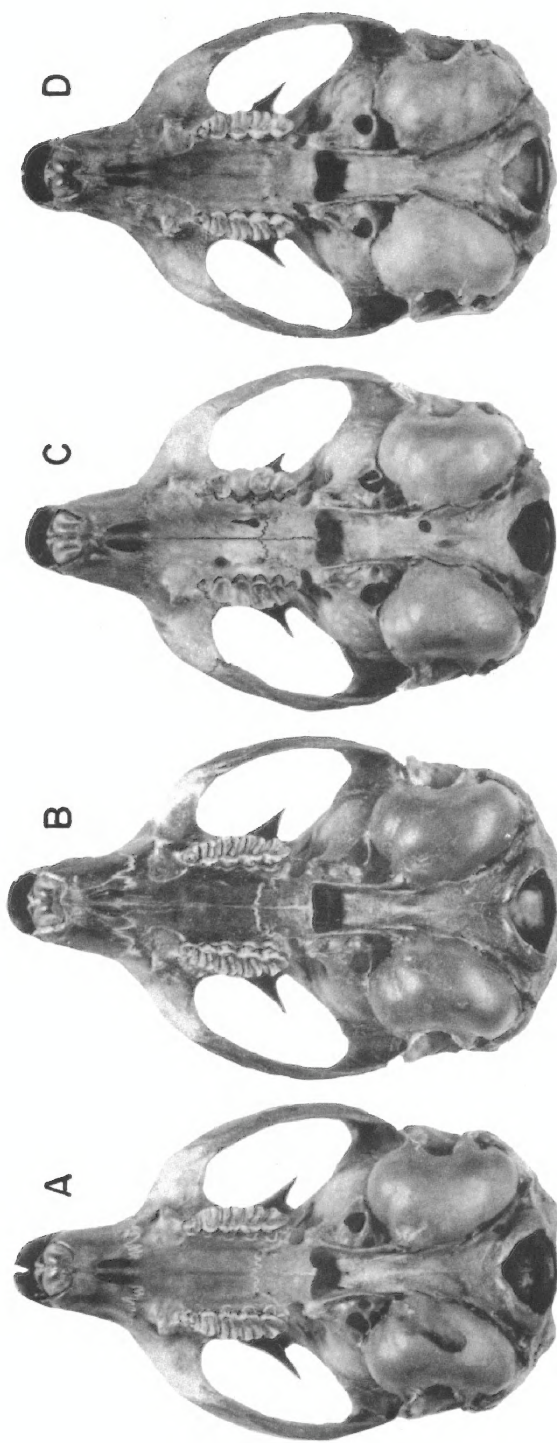


FIG. 5. Ventral view of cranium. A. *Glaucomys volans oaxacensis*, adult female, U.M. No. 94482, Cerro San Felipe, Oaxaca. B. *G. v. herreranus*, adult female, L.S.U. No. 4190, Santa Barbarita, San Luis Potosí. C. *G. v. goldmani*, adult female, topotype, U.S.N.M. No. 132834, Teopisca, Chiapas. D. *G. v. underwoodi*, adult male, C.N.H.M. No. 53576, Gracias, Honduras. All $\times 2$.

of patagium which is pale buff; tail (much worn) dull brownish above, Pinkish Buff below, fore feet white; hind feet soiled whitish, soles of feet in topotype hairy; eyes narrowly ringed with black; postorbital area grayish; skull small, with a small but highly domed braincase and a short, very shallow rostrum.

SPECIMENS EXAMINED: Chihuahua: Sierra Madre, one, topotype (U.S.N.M.).

MEASUREMENTS (IN MILLIMETERS) OF TYPE AND TOPOTYPE: Total length, 220, 210; length of tail, 88, 85; hind foot, 31, 30; greatest length of skull, 34.5, 33.0; zygomatic breadth, 21.4, 18.9; cranial depth, —, 16.8; maxillary tooth row, 6.5, 6.4. (For additional measurements, see tables 1 and 2.)

REMARKS: The pelages of the type and topotype are so badly faded that their original color cannot be determined. Both specimens apparently had been exposed to light for an unknown period of time in the Museo Nacional de la Historia Natural, Mexico, before they were donated to the United States National Museum in 1926 and there converted into conventional study skins. When Alfonso L. Herrera presented these two specimens to the United States National Museum, he told Major Goldman that they were from the Sierra Madre of Chihuahua, but there is no other proof of where they came from except that on the label is penciled "Chihuahua."

***Glaucomys volans oaxacensis*, new subspecies**

Figures 2C, 3A, 4C, 5A, 6C, 7A

TYPE: A.M.N.H. No. 178733; skin, skull, and part of skelton; adult male; from San Pedro Jilotepec, District of Tehuantepec, Oaxaca, Mexico, altitude about 5000 feet; collector Thomas MacDougall; original no. 1991; November 4, 1957; skin in fair condition, skull complete.

RANGE: Highlands of central Oaxaca west of the Isthmus of Tehuantepec, and west of Acahuiztatla in southeastern Guerrero.

DIAGNOSIS: A small, pale buffy flying squirrel; skull short and broad; rostrum short, slender; superior outline of skull rising to a domed braincase. Similar to *Glaucomys volans goldmani* but paler dorsally, skull smaller, braincase more elevated. Decidedly paler and having larger skull and larger molariform teeth than *G. v. chontali*, the subspecies geographically nearest.

DESCRIPTION OF TYPE: Upper parts Pinkish Buff, the hair dark brown from base for most of its length, this color extending over top of head and thinly over patagium; upper side of fore feet soiled whitish; upper side of hind feet Hair Brown, becoming more brownish on toes; upper

side of tail Snuff Brown; ventral side of tail Pinkish Buff; eyes narrowly ringed with Blackish Brown; extreme tip of nose whitish; space between eye and ear Blackish Brown; area below ear grayish; cheeks and postauricular patch buffy white; under side of body white; under side of patagium Pinkish Buff. Skull short and broad; zygomatic arches evenly spreading; braincase relatively high domed; rostrum short; palate broad; molariform teeth moderately large.

MEASUREMENTS (IN MILLIMETERS) OF TYPE: Total length, 230; length of tail, 104; hind foot, 30; greatest length of skull, 35.3; condylobasal length, 32.3; zygomatic breadth, 21.0; mastoid breadth, 16.4; interorbital breadth, 6.9; postorbital breadth, 9.5; length of nasals, 9.5; breadth of nasals anteriorly, 5.1; breadth of palate across molars, 8.4; breadth of M^2 , 1.7; length of bullae, 9.8; diastema, 6.8; cranial depth, 17.6; maxillary tooth row, 6.6. (For other measurements, see tables 1 and 2.)

SPECIMENS EXAMINED: Guerrero: Acahuizotla, two (T.A.M.). Oaxaca: Cerro San Felipe, altitude 2900–3000 meters, one (U.M.); Cerro Yucuyacua, District of Tlaxiaco, altitude 7000 feet, one (A.M.N.H.); San Pedro Jilotepec, one, type (A.M.N.H.); Santo Domingo Nejapa, two (U.K.).

REMARKS: Hooper (1952, p. 110) stated that the specimen from Cerro San Felipe does not entirely agree with holotypes of *herreranus*, *goldmani*, or *madrensis* and that, compared with the holotype of *goldmani*, it is paler and less reddish dorsally and is a paler buff ventrally. My own observations agree closely with Hooper's findings, and in addition I find that the skull of *G. v. oaxacensis* is smaller and that it has a more rounded braincase and a shorter rostrum than *goldmani*. The two specimens from Najapa and the one from Acahuizotla are paler in color than the type and have more extensive white markings on the sides of the head, but all three specimens are immature. An immature specimen of *G. v. goldmani* from Comitán is also paler in color and has more extensive white markings on the side of the head than do adult specimens from the same locality.

Glaucomys volans underwoodi Goodwin

Figures 3A, 5D, 7D

Pteromys volucella, TOMES, 1861, Proc. Zool. Soc. London, p. 281. Duenas, Guatemala.

Glaucomys volans underwoodi GOODWIN, 1936, Amer. Mus. Novitates, no. 898, p. 1.

TYPE LOCALITY: Zambrano, Tegucigalpa, Honduras, altitude 4500 feet.

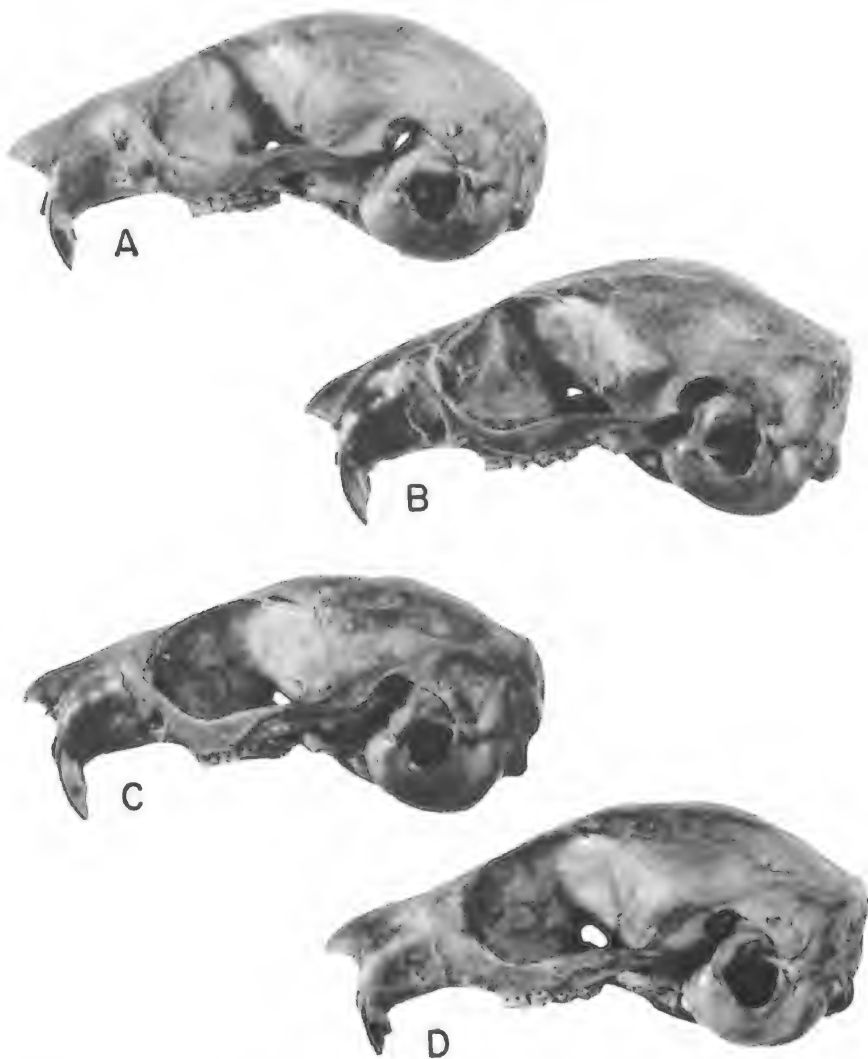


FIG. 6. Lateral view of cranium. A. *Glaucomys volans chontali*, adult male, type, A.M.N.H. No. 185014, Chontecomatlán, Oaxaca. B. *G. v. madrensis*, adult, topotype, U.S.N.M. No. 261693, Sierra Madre, Chihuahua. C. *G. v. oaxacensis*, adult male, type, A.M.N.H. No. 178733, Jilotepec, Oaxaca. D. *G. v. goldmani*, adult male, C.N.H.M. No. 64183, Ococingo, Chiapas. All $\times 2$.

RANGE: Mountains of southern Honduras and Guatemala.

DESCRIPTION: A moderately large flying squirrel of pale Sayal Brown, similar to *Glaucomys volans goldmani* but paler and differing in cranial de-

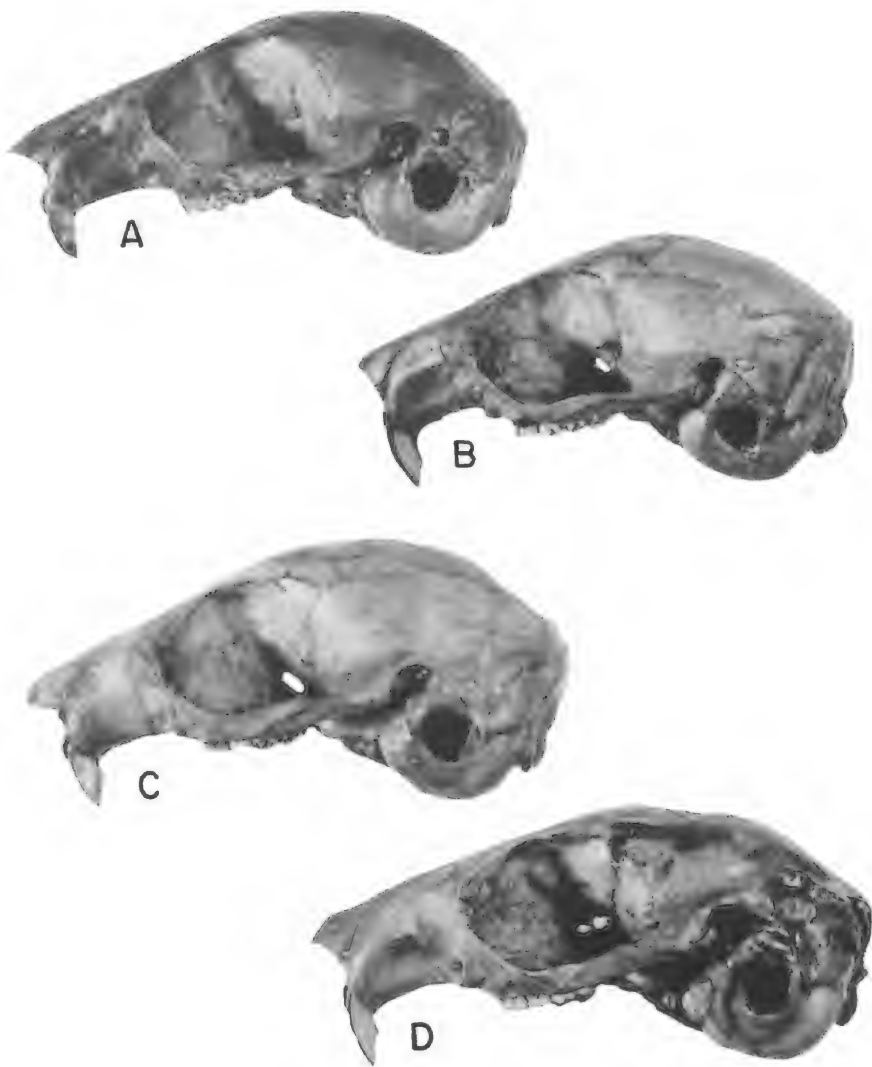


FIG. 7. Lateral view of cranium. A. *Glaucomys volans oaxacensis*, adult female, U.M. No. 94482, Cerro San Felipe, Oaxaca. B. *G. v. herreranus*, adult female, L.S.U. No. 4190, Santa Barbarita, San Luis Potosí. C. *G. v. goldmani*, adult female, topotype, U.S.N.M. No. 132834, Teopisca, Chiapas. D. *G. v. underwoodi*, adult male, C.N.H.M. No. 53576, Gracias, Honduras. All $\times 2$.

tails; superior outline of skull evenly rounded and rising to a high domed braincase; zygomatic arches widely spread and evenly bowed outward.

SPECIMENS EXAMINED: Guatemala: Tecpan, 8800 feet, four (C.N.H.M.). Honduras: Gracias, two, in spirits (C.N.H.M.); Zambrano, 4500 feet, one, the type (A.M.N.H.).

MEASUREMENTS (IN MILLIMETERS) OF TWO ADULT MALES FROM GRACIAS, HONDURAS: Total length, —, 240; length of tail, —, 100; hind foot, 33.0, 29.0; greatest length of skull, 35.5, 34.9; zygomatic breadth, 21.3, 20.7; cranial depth, 17.4, 17.1; maxillary tooth row, 6.5, 6.5. (For additional measurements, see tables 1 and 2.)

REMARKS: Specimens from Tecpan, Guatemala, are similar in size and color to typical *Glaucomys volans goldmani* from Chiapas, Mexico, but the skulls resemble those of other *G. v. underwoodi*, especially in the shorter rostrum and more rounded and elevated braincase. The two specimens, in spirits, from Gracias, Honduras, are darker and more richly colored than the specimen from Zambrano, Honduras, but the preservatives may deepen and brighten the shades of color in the pelage.

Tomes (1861, p. 281), under the name of *Pteromys volucella* Desmarest, apparently following Pallas' renaming of [*Mus*] *volans* Linnaeus, records a specimen of flying squirrel from Duenas, Guatemala, which undoubtedly is referable to the present form.

KEY TO THE SUBSPECIES OF *Glaucomys volans* OF MIDDLE AMERICA

1. Size small; length of skull, 33.0–34.5 2
 Size medium to large; length of skull, 34.5–37.2 3
2. Color Ochraceous Tawny; hind feet black *chontali*
 Color Pinkish Buff; hind feet buffy white *madrensis*
3. Cranial depth generally less than mastoid breadth 4
 Cranial depth generally equal to or greater than mastoid breadth 5
4. Color Sayal Brown *goldmani*
 Color Cinnamon Brown *herreranus*
5. Color pale Sayal Brown *underwoodi*
 Color Pinkish Buff *oaxacensis*

LITERATURE CITED

- HOOPER, EMMET T.
 1952. Records of the flying squirrels (*Glaucomys volans*) in Mexico. Jour. Mammal., vol. 33, no. 1, pp. 109–110.
- HOWELL, ARTHUR H.
 1918. Revision of the American flying squirrels. North Amer. Fauna, no. 44, pp. 1–64.
- RIDGWAY, ROBERT
 1912. Color standards and color nomenclature. Washington, pp. i–iii, 1–43, pls. 1–53.
- TOMES, ROBERT F.
 1861. Report of a collection of mammals made by Osbert Salvin, Esq., F.Z.S.,

at Dueñas, Guatemala, with notes on some of the species by Mr. Fraser. Proc. Zool. Soc. London, pp. 278–288.

TABLE 1
EXTERNAL MEASUREMENTS (IN MILLIMETERS) AND WEIGHTS (IN GRAMS) OF MIDDLE AMERICAN SUBSPECIES OF *Glaucomys volans*

Specimen Number and	Sex	Age	Locality	Total Length	Length of Tail	Hind Foot	Ear	Weight	Remarks
<i>G. v. chontali</i>									
A.M.N.H. No. 185014	♂	Ad.	OAXACA Chontecomatlán	210	94	28.0	15.0	—	Type
<i>G. v. goldmani</i>									
CHIAPAS									
U.K. No. 61315	♂	Ad.	Comitán	235	110	31.0	18.0	—	—
U.K. No. 61316	♀	Ad.	Comitán	229	106	32.0	19.0	—	—
U.K. No. 61317	♀	Juv.	Comitán	229	108	31.0	18.0	—	—
C.N.H.M. No. 64179	♂	Ad.	Ocoingo	240	100	30.0	17.0	—	Dry skin
C.N.H.M. No. 64180	♀	Ad.	Ocoingo	245	100	30.4	18.0	—	Dry skin
C.N.H.M. No. 64181	♀	Old	Ocoingo	243	95	30.5	17.0	—	Dry skin
C.N.H.M. No. 64182	♀	Ad.	Ocoingo	230	95	30.3	17.0	—	Dry skin
C.N.H.M. No. 64183	♂	Old	Ocoingo	230	100	30.1	18.0	—	Dry skin
C.N.H.M. No. 64184	♀	Ad.	Ocoingo	215	95	31.0	18.0	—	Dry skin
C.N.H.M. No. 64185	♀	Juv.	Ocoingo	240	100	30.0	17.0	—	Dry skin
I.B.M. No. 5229	♂	Sub.	Palma Real	240	100	30.0	15.0	—	Dry skin
U.K. No. 66571	♂	Ad.	San Cristóbal	242	103	32.0	22.0	70	—
U.K. No. 66572	♂	Ad.	San Cristóbal	236	103	32.0	19.0	80	—
U.K. No. 66574	♂	Ad.	San Cristóbal	228	92	28.0	19.0	66	—

TABLE 1—(Continued)

Specimen Number	Sex	Age	Locality	Total Length	Length of Tail	Hind Foot	Ear	Weight	Remarks
U.K. No. 66575	♂	Sub.	San Cristóbal	222	100	31.0	19.5	56	—
U.K. No. 66576	♀	Juv.	San Cristóbal	225	100	31.0	21.0	53	—
U.K. No. 61318	♀	Ad.	San Cristóbal	247	115	30.0	19.0	—	—
U.S.N.M. No. 132833	♂	Old	Teopisca	237	112	30.0	—	—	Type
U.S.N.M. No. 132834	♀	Old	Teopisca	238	107	31.5	—	—	—
<i>G. v. herteranus</i>									
L.S.U. No. 4189	♂	Ad.	SAN LUIS POTOSÍ	229	102	33.0	22.0	—	—
L.S.U. No. 4190	♀	Ad.	Santa Barbarita	224	102	33.0	22.0	—	—
VERACRUZ									
U.S.N.M. No. 261695	♀	Sub.	Mountains	198	89	30.0	22.0	—	Dry skin, type
<i>G. v. madrensis</i>									
CHIHUAHUA									
U.S.N.M. No. 261694	?	Ad.	Sierra Madre	220	88	31.0	—	—	Dry skin, type
U.S.N.M. No. 261693	?	Ad.	Sierra Madre	210	85	30.0	—	—	Dry skin
<i>G. v. oaxacensis</i>									
GUERRERO									

TABLE 1—(Continued)

Specimen Number	Sex	Age	Locality	Total Length	Length of Tail	Hind Foot	Ear	Weight	Remarks
C.S.T. No. 5028	♂	Sub.	Acahuizatlá	230	98	30.0	19.0	—	
			OAXACA						
A.M.N.H. No. 17833	♂	Ad.	Jilotepec	230	104	30.0	16.0	—	Type
U.M. No. 94482	♀	Ad.	Cerro San Felipe	251	109	31.0	20.5	—	—
U.K. No. 68833	♂	Juv.	Nejapa	211	93	29.0	18.0	—	—
U.K. No. 68834	♀	Juv.	Nejapa	228	102	29.0	19.0	59	—
A.M.N.H. No. 145211	?	Sub.	Tlaxiaco	225	93	29.0	—	—	Dry skin
			GUATEMALA						
C.N.H.M. No. 41762	♂	Ad.	Tecpan	238	114	32.0	16.0	—	—
C.N.H.M. No. 41763	♀	Sub.	Tecpan	250	110	32.0	18.0	—	—
C.N.H.M. No. 41764	♂	Juv.	Tecpan	240	107	33.0	16.0	—	—
C.N.H.M. No. 41765	♂	Ad.	Tecpan	250	111	33.0	17.2	—	—
			HONDURAS						
C.N.H.M. No. 53576	♂	Ad.	Gracias	—	—	33.0	17.0	—	In spirits
C.N.H.M. No. 53577	♂	Ad.	Gracias	240	100	33.0	17.0	—	In spirits
A.M.N.H. No. 123572	♂	Ad.	Zambrano	241	105	29.0	16.0	—	Type

G. v. underwoodi

TABLE 2

CRANIAL MEASUREMENTS (IN MILLIMETERS) OF SUBSPECIES OF MIDDLE AMERICAN *Glaucomys volans*

Specimen and Number	Sex	Age	Locality	Greatest Length	Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Interorbital Breadth	Postorbital Breadth	Nasal Length	Nasals, Greatest Width	Palatal Width Across Molars	Width of M ²	Maxillary Tooth Row	Cranial Depth
<i>G. v. chontali</i>															
OAXACA															
A.M.N.H. No. 185014	♂	Ad.	Chontecomatlán	33.4	30.4	20.2	16.0	6.3	8.3	8.0	4.1	7.9	1.5	6.1	16.5
<i>G. v. goldmani</i>															
CHIAPAS															
U.K. No. 61315	♂	Ad.	Comitán	35.5	32.5	21.5	17.6	6.7	9.0	10.3	4.6	8.4	1.9	6.8	16.5
U.K. No. 61316	♀	Ad.	Comitán	34.4	31.9	21.3	17.3	7.2	9.3	9.6	4.7	8.5	1.8	6.5	17.2
U.K. No. 61317	♀	Juv.	Comitán	35.3	32.6	20.4	17.3	6.3	9.5	9.8	4.7	8.5	1.8	6.5	16.6
C.N.H.M. No. 64179	♂	Ad.	Ocoingo	35.0	32.1	21.5	17.7	6.6	8.6	10.2	—	8.3	2.0	6.5	17.6
C.N.H.M. No. 64180	♀	Ad.	Ocoingo	35.0	—	21.2	17.8	6.7	8.9	10.2	4.4	8.4	1.9	6.7	17.5
C.N.H.M. No. 64181	♀	Old	Ocoingo	35.0	—	21.2	17.3	7.4	8.9	10.0	—	8.5	1.9	6.5	16.8
C.N.H.M. No. 64182	♀	Ad.	Ocoingo	35.4	32.5	21.8	17.6	7.0	9.0	10.3	4.8	8.4	2.0	6.5	16.8
C.N.H.M. No. 64183	♂	Old	Ocoingo	36.8	33.5	21.6	18.5	7.4	9.0	11.3	5.0	8.4	1.9	6.5	17.1
C.N.H.M. No. 64184	♀	Ad.	Ocoingo	36.5	33.4	21.5	17.6	6.8	8.7	10.0	4.8	8.4	1.9	6.8	17.2
C.N.H.M. No. 64185	♀	Juv.	Ocoingo	35.7	32.8	21.0	17.5	6.5	8.8	9.8	4.8	8.3	2.0	6.7	17.1
I.B.M. No. 5229	♂	Sub.	Palma Real	35.5	32.5	21.5	17.6	6.7	9.0	10.3	4.6	8.4	1.9	6.8	16.5
U.K. No. 66571	♂	Ad.	San Cristóbal	35.5	32.9	21.0	17.8	7.2	8.3	11.0	4.7	8.4	1.8	6.2	16.8
U.K. No. 66572	♂	Ad.	San Cristóbal	37.2	33.5	22.0	18.5	7.1	8.8	11.4	5.1	8.5	1.8	6.2	17.3
U.K. No. 66574	♂	Ad.	San Cristóbal	35.1	32.1	21.0	17.1	6.7	9.1	10.3	4.8	8.0	1.8	6.7	16.7

TABLE 2—(Continued)

Specimen and Number	Sex	Age	Locality	Greatest Length	Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Interorbital Breadth	Postorbital Breadth	Nasal Length	Nasals, Greatest Width	Palatal Width Across Molars	Width of M ²	Maxillary Tooth Row	Cranial Depth
U.K. No. 66575	♂	Sub.	San Cristóbal	34.4	30.6	20.0	17.1	6.7	9.2	10.5	4.8	8.2	1.7	6.5	18.0
U.K. No. 66576	♀	Juv.	San Cristóbal	34.0	30.5	19.3	17.4	6.5	9.0	10.0	4.0	8.4	1.8	6.9	17.0
U.K. No. 61318	♀	Ad.	San Cristóbal	36.4	33.2	21.7	18.3	6.9	8.7	11.1	4.6	8.7	1.9	6.7	16.9
U.S.N.M. No. 132833	♂	Old	Teopisca	35.1	32.1	21.3	17.8	7.7	8.5	10.3	4.8	—	1.8	6.5	—
U.S.N.M. No. 132834	♀	Old	Teopisca	34.7	32.0	21.7	17.5	7.2	9.1	10.0	4.3	8.8	1.8	6.3	16.7
<i>G. v. hellerianus</i>															
			SAN LUIS POTOSÍ												
L.S.U. No. 4189	♂	Ad.	Santa Barbarita	35.2	32.0	19.7	17.7	7.2	8.8	9.7	4.5	8.3	1.7	6.4	17.3
L.S.U. No. 4190	♀	Ad.	Santa Barbarita	35.5	32.7	21.5	17.8	7.7	9.1	10.0	4.7	8.6	1.7	6.5	17.0
VERACRUZ															
U.S.N.M. No. 261695	♀	Sub.	Mountains	—	—	—	—	—	—	—	—	—	1.7	6.3	—
<i>G. v. madrensis</i>															
			CHIHUAHUA												
U.S.N.M. No. 261694	?	Ad.	Sierra Madre	34.5	31.3	21.4	17.6	7.2	9.1	9.5	4.7	8.4	1.9	6.5	—
U.S.N.M. No. 261693	?	Ad.	Sierra Madre	33.0	30.3	18.9	17.1	6.6	9.0	9.0	4.7	8.1	1.8	6.4	16.8
<i>G. v. oaxacensis</i>															
			GUERRERO												

TABLE 2—(Continued)

Specimen and Number	Sex	Age	Locality	Greatest Length	Condylobasal Length	Zygomatic Breadth	Mastoid Breadth	Interorbital Breadth	Postorbital Breadth	Nasal Length	Nasals, Greatest Width	Palatal Width Across Molars	Width of M ²	Maxillary Tooth Row	Cranial Depth
C.S.T. No. 5028	♂	Sub.	Acahuizotla	34.5	30.8	20.2	17.2	7.0	—	9.5	4.5	8.4	1.8	6.5	16.4
C.S.T. No. 5029	?	Sub.	Acahuizotla	34.1	31.7	21.3	17.3	6.8	9.0	—	—	8.4	1.8	6.5	17.4
OAXACA															
A.M.N.H. No. 17833	♂	Ad.	Jilotepec	35.3	32.3	21.0	16.4	6.9	9.5	9.5	5.1	8.4	1.7	6.6	17.6
U.M. No. 94482	♀	Ad.	Cerro San Felipe	34.7	31.8	21.0	17.4	7.0	9.0	9.7	4.5	8.4	1.7	6.3	16.9
U.K. No. 68833	♂	Sub.	Nejapa	33.7	30.7	20.0	17.5	6.7	8.5	9.6	4.6	7.8	1.8	6.4	16.7
U.K. No. 68834	♀	Sub.	Nejapa	33.6	—	21.0	—	6.5	8.4	9.7	4.9	8.2	1.8	6.2	16.5
<i>G. v. underwoodi</i>															
GUATEMALA															
C.N.H.M. No. 41762	♂	Ad.	Tecpan	36.0	32.8	21.2	17.3	7.1	9.2	10.0	4.9	8.5	1.9	6.5	17.5
C.N.H.M. No. 41763	♀	Sub.	Tecpan	35.1	31.5	20.4	17.5	7.0	9.1	10.0	4.5	8.4	1.9	6.6	17.5
C.N.H.M. No. 41764	♂	Juv.	Tecpan	35.2	32.4	21.0	17.2	6.8	9.5	10.1	4.7	8.5	2.0	6.7	17.1
C.N.H.M. No. 41765	♂	Ad.	Tecpan	35.7	31.7	21.0	17.7	6.5	9.0	10.1	4.6	8.6	2.0	7.0	17.8
HONDURAS															
C.N.H.M. No. 53576	♂	Ad.	Gracias	35.5	32.3	21.3	17.6	6.7	8.4	10.9	4.7	8.1	1.8	6.5	17.4
C.N.H.M. No. 53577	♂	Ad.	Gracias	34.9	31.7	20.7	17.5	6.6	9.1	9.6	4.7	8.3	1.8	6.5	17.1
A.M.N.H. No. 123372	♂	Ad.	Zambrano	35.5	—	—	—	6.9	9.0	10.2	5.0	8.3	1.8	6.6	—